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- a) amplifying a received signal according to an adjustable amplification factor to generate an amplified analog signal, wherein said adjustable amplification factor is determined by an analog gain control signal;
- b) converting said amplified analog signal from analog format into an amplified digital signal;
- c) calculating signal strength of said amplified digital signal;
- d) generating a gain adjusting factor based on a predefined relation between signal strength and a reference gain adjusting factor;
- e) updating a digital gain control signal by multiplying said digital gain control signal by said gain adjusting factor; and
- f) converting said digital gain control signal to said analog gain control signal.

36. (New) The method according to claim 35, wherein said step of generating a gain adjusting factor generates the gain adjusting factor according to a mathematics formula describing a relation between the signal strength and a reference gain adjusting factor.

37. (New) The method according to claim 35, wherein said step of generating a gain adjusting factor generates the gain adjusting factor based on a set of number pairs describing a relation between the signal strength and a reference gain adjusting factor.

38. (New) The method according to claim 35, wherein said step of updating a digital gain control signal updates said digital gain control signal by making use of a relation of new gain versus current and previous signal strengths and current and previous gains.

#### **REMARKS – General**

##### **The Objection To Drawings**

Figure 1 was objected to because “only that which is old is illustrated”. By above amendment, the applicant has amended the drawings to designate Figure 1 as Prior Art as suggested by the Examiner and also label Figure 1 as “Replacement Sheet” in the page header.

##### **The Objection To The Claims 1 and 3-7 for informalities**

The claims 1, 3-7, and 15-20 were objected to because of the informalities in these claims. By the above amendment, the applicant has amended the claims to remove the informalities and rewritten these claims in more effective English.

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**The Objection and Rejections To The Claims 15-20 Under & 102**

The claims 15-20 have been canceled.

The new claim 35 is based on old claim 15 and what the prior art fail to disclose as stated by the Examiner in OA item 8.

The new claim 36 is based on new claim 35, old claim 17, and what the prior art fail to disclose as stated by the Examiner in OA item 10.

The new claim 37 is based on new claim 35, old claim 18, and what the prior art fail to disclose as stated by the Examiner in OA item 10.

The new claim 38 is based on new claim 35, old claim 20, and what the prior art fail to disclose as stated by the Examiner in OA item 11.

**The Restriction and/Or Election Requirement to The Claims 8-14:**

The applicant would like to indicate the application classified as class 455, subclass 240.1, which is the provisional election that the Examiner has made. Since there is a very strong relation between one preferred implementation called by the Examiner as Invention I and another preferred implementation called by Examiner as Invention II, both Invention I and Invention II are related and should be considered as two slightly different implementations of a same invention. In fact, Invention I is a special case of Invention II and Invention II is a generalized case of Invention I.

**a. Invention I is a special case of Invention II and Invention II**

In Invention II, when the first memory device contains only the very most recent signal strength, the second memory device contains only the very most recent digital control gains, and the gain generating device has a algorithm to find gain adjusting factor based on the most very most recent signal strength and then to generates a new gain by multiplying the very most recent gain with the gain adjusting factor, then the Invention II will become Invention I.

**b. Invention II is a generalized case of Invention I**

1) In Invention I, communication engineers can add a digital filter before the digital-to-analog converter to further smooth the gain control signal. The digital filter consists of a set of shift registers as well as the implementation of a filtering algorithm for generating the output of the filter. These shift registers are one kind of the first memory of Invention II and the filtering algorithm is a task to be accomplished in the gain generating device of Invention II.

2) In Invention I, communication engineers can add a digital filter after the signal strength estimator to smooth the estimation of signal strength or to perform some special processing. Again the digital filter consists of a set of shift registers as well as the implementation of a filtering algorithm. These shift registers are one kind of the second memory of Invention II and the filtering algorithm is another task to be accomplished in the gain generating device of Invention II.

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3) The gain generating device of Invention II can be implemented to make use of the information saved in both the first memory and the second memory in order to provide an algorithm for handling more complex situation such as the ones given in the application.

4) The gain generating device of Invention II further extends the multiplier used in Invention I to a general signal processing unit to update gain based on stored signal strengths and stored gains as well as other information available.

c. Invention I and Invention II are based on the same idea. Though the application can greatly relax the required computing speed and simplify AGC design based on the prior art cited by the applicant, the application are not limited to the simplification of the prior art.

1) The so called Invention I shows people example how to design a digital AGC circuit to meet specific AGC adjustment requirement based on curve and formula. The Invention I is a natural progress of the prior patent cited by the applicant. The Invention I shows people how to design a digital AGC based on curve and formula and how to design a digital AGC as a whole part instead of designing each part separately as did in the cited prior patent.

2) The so called Invention II further extends the idea used in Invention I. The Invention II displays a very flexible digital AGC structure for implementing algorithm for dealing with complex situation by making use of stored signal strengths and stored gain values as well as other information. The stored signal strength includes not only the current signal strength but also some other most recent signal strengths. Similarly, the stored gain values includes not only the current gain value but also some other most recent gain values. The other information can include any information passed down from higher level of communication protocol layers. As shown in application, some examples are if the packet is at the beginning of a new package or in the middle of a current package, or how far the receiver is away from transmitter, channel model. The Invention II shows people how to design a digital AGC based on the relation among current signals strength, previous signal strengths, current gain, previous gains and other possible parameters. The relation can be in form of curve, formula, or a set of number pairs.

#### **The Rejection Of The Claim 3 Under & 112 Is Overcome**

The applicant has changed "gain adjusting factor" into "a reference gain adjusting factor" as suggested by the Examiner.

#### **The Rejection To The Claim 4 Under & 112 Is Overcome**

The applicant has changed "the group" into "a group of" as suggested by the Examiner.

#### **The Rejection To The Claim 7 Under & 112 Is Overcome**

The applicant has changed "select a gain adjusting factor from a plurality of gain adjusting factors" into "select a gain adjusting factor from a plurality of reference gain adjusting factors" as suggested by the Examiner.

#### **The Rejections To The Claim 17 Under & 112 Is Overcome**

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The applicant has changed "said gain adjust factor generates a gain adjusting factor" into "a gain adjusting factor device generates the gain adjusting factor", and "said gain adjusting factor" into "a reference gain adjusting factor" both as suggested by the Examiner.

**The Rejections To The Claim 18 Under & 112 Is Overcome**

The applicant has changed "said gain adjusting factor generates a gain adjusting factor" into "a gain adjusting factor device generates the gain adjusting factor", and "said gain adjusting factor" into "a reference gain factor" both as suggested by the Examiner.

**The Allowable Subject Matter to Claims 1, 3-4, 17-18, and 20**

The applicant has overcome the objects to claims 1-2 and 5-6 by following the suggestion of the Examiner.

The applicant has overcome the rejections to claims 3-4 by following the suggestion of the Examiner.

The applicant has cancelled 15-20 and rewrite claims 35-38 by following the suggestion of the Examiner.

**Conclusion**

For all of above reasons, the applicant submits that claims are now in proper form, and that the claims all define patentably over the prior art. Further, applicant provides numerous reasons that Invention I and Invention II are one invention instead of two inventions. Therefore the applicant submits that this application is now in condition for allowance, which action they respectfully solicit.

**Conditional Request for Constructive Assistance**

The applicant has amended the claims of this application so that they are proper, definite, and related, and define novel structure. If, for any reason this application is not believed to be in full condition for allowance, applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P § 2173.02 and § 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,

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